



# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

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TO: Internal File

THRU: Wayne H. Western, Senior Reclamation Engineer/Team Lead

FROM: Priscilla W. Burton, Senior Reclamation Specialist/Soils 

RE: Revision to Reclamation Plan, Energy West Mining Company, Deer Creek Mine, C/015/018-AM99C-(5)

## SUMMARY:

The Division requested information from Energy West in a letter dated July 16, 1998 as part of a mid-term review of the Deer Creek Mine. The chronology of the mid-term review is itemized below along with the reviewer of each submittal.

Energy West Submittals	Division Review Date	Soils Reviewer
8/7/98 initial mid term submittal	September 14, 1998 request for highwall elimination plan	
May 26, 1999 revised reclamation plan including highwall elimination	July 6, 1999	Davidson
December 6, 1999	March 13, 2000	Davidson
September 21, 2000	November 3, 2000	Baker
March 22, 2001	May 18, 2001	Baker
July 20, 2001	September 27, 2001	Burton
November 9, 2001	This document	Burton

The information submitted supercedes that in the approved MRP, Volume 2, Part 4.

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The Permittee has further characterized the refuse with sampling. The analyses confirm rather the fact that the refuse is toxic forming. Therefore the refuse requires four feet of cover. The submittal does indicate that all toxic and acid-forming material will be covered with four feet of material. It would be prudent for the Permittee to estimate the volume of the waste that will require the four-foot cover depth. Sampling of the site in 2002 should allow for further characterization and quantification of the waste.

The submittal identifies enough cover for a twenty-seven inch substitute topsoil depth over the entire site. The Mining and Reclamation Plan (Vol. 2, Part 4, page 4-29) outlines the salvage of the upper 18 – 24 inch layer on the fill slopes at the equipment yard and run of mine conveyor (which were seeded twenty years ago) for substitute topsoil. This submittal does not include this substitute topsoil salvage, but should continue to incorporate the salvage of the twenty-four inches from the out slopes, due to the additional requirement for adequate cover over the refuse.

A large area of terraced hillside will remain un-reclaimed as a visual scar on the landscape. These terraces are pre-law disturbances and should be brought to the attention of the Abandoned Mine Reclamation program Administrator.

**TECHNICAL ANALYSIS:**

**OPERATION PLAN**

**TOPSOIL AND SUBSOIL**

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-230.

**Analysis:**

**Topsoil Substitutes and Supplements**

*Exploration/Sampling Program - Substitute Topsoil*

The Deer Creek Mine was developed prior to enactment of the Surface Mining Control and Reclamation Act (SMRCA), and topsoil was not salvaged or stockpiled during construction and mine development activities. The applicant intends to use construction fills within the disturbance area as substitute topsoil. Much of this fill material came from the terraced area on the south side of Deer Creek Canyon.

In 1999, eighteen samples were taken from the terraces from which much of the fill originated, and these were analyzed for the parameters in the Division's soils guidelines. Sample

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locations are shown on DS-1810-D and results are in Appendix R645-301-200-C. There is no information about the depth of sampling or whether these samples were composites. Clay percentages are high (averaging 32% in the upper two terraces) and textures are listed mostly as clay loam. The pH is just above neutral. The Electrical Conductivity is less than 0.7 mmhos/cm.

Total Organic Carbon content was on the average 5.3%, whereas total Nitrate Nitrogen averaged 0.39 ppm.

Most of the samples from 1980 and 1983 show few problems with EC or SAR values; however, two samples from the parking lot fill slope had EC values of 9.0 (assumed to be mmhos  $\text{cm}^{-1}$ ). This could be a result of using salt as discussed above, and the problem may have grown progressively worse to where some of these soils are now unusable.

The Permittee commits in this application to conduct a soils sampling program during in June through October of 2001 and 2002. The areas to be sampled will be at accessible sites between 9+00 - 15+00 and 24+00 - 30+00 shown on map DS-1782-D (as stated in Appendix R645-301-200-A). As stated on page 2-2 and in Appendix A, testing will be done according to the Division's soils guidelines. The timetable commitment is acceptable, and it is important that the Permittee and the Division ensure soil samples are actually taken and analyzed and that the mining and reclamation plan is amended accordingly.

Fill materials, which have been seeded for 15 to 20 years, may also be a source of cover material to be used a cover over the site.

*Exploration/Sampling Program – Refuse Piles*

Within Chapter 3 of the current mining and reclamation plan, page 3-65, Table 7, Deer Creek Mine - Waste Rock Analysis, several problems are identified associated with materials taken from roof and floor materials. Data is incomplete since no determinations were made for selenium or for acid base potential. One of the samples had a paste pH value of 5.87, which indicates there could be acid forming potential. One Blind Canyon floor sample apparently had a very high SAR value, which indicates that although some areas may meet the Division's criteria, there are probably isolated problem areas.

The Division lacks confidence in the data in Table 7 because some of the SAR values do not correlate with the reported calcium, magnesium, and sodium values. Either some of the SAR values were calculated incorrectly or the sodium, calcium, and magnesium values were not reported correctly.

Tables I and II in Chapter 4 also show some chemical analyses of coal waste and one sample of slag. The slag sample had a very high pH (10.9), but otherwise, no problems were found in the refuse or slag samples. However, the applicant did not test these samples for several parameters listed in the Division's *Guidelines for Management of Topsoil and Overburden for*

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*Underground and Surface Coal Mines.* The Division recognizes that the 1980 thru 1983 operational sampling took place prior to implementation of the 1988 guidelines for topsoil and overburden. However, reclamation standards for soil and overburden are now rated using the 1988 guidelines. Therefore, since sampling did not follow the current 1988 Division guidelines for topsoil and overburden, information in Tables I and II is incomplete and does not show that the fill or refuse materials in Deer Creek and Elk canyons are suitable for achieving the revegetation standards.

The Division cannot make a determination of waste acceptability based upon early sampling. Errors exist within some of the data in the current plan, and some analyses are incomplete and do not follow the Division's soils guidelines. Furthermore, unacceptable criteria are identified for Blind Canyon floor samples for SAR and pH, and poor criteria are met on Blind Canyon split samples for SAR and on Hiawatha floor samples for pH. Therefore, since data errors exist, data is incomplete, and roof and floor analyses identify toxicity, the Division determines that the refuse is toxic forming and unacceptable for plant growth and must be covered with a minimum of four feet of acceptable material.

Appendix R645-301-200-A contains recent analyses (2001) of two core samples from the refuse piles, one from Deer Creek Canyon (site #1) and one from Elk Canyon (site #6). Sample locations are shown on Drawing DS-1810-D. Sites #1 and #6 were sampled to depths of 25 feet. The texture of the material at site #1 was a sandy loam with a clay loam layer between 6 and 7.5 feet. At site #6, the texture was a sandy loam with a higher clay content at three feet creating a loam texture. Acid base accounting information is positive for sample sites #1 and #6, however the refuse will require four feet of cover based upon the following information from the 2001 sampling:

- Extreme sodicity was found to a depth of 7.5 feet at site #1; SAR values were 30.7 and 42. This could be because the sample site was near two storage docks where salt may have been used. The refuse in Elk Canyon, site 6, is also sodic, but not to the extreme noted at site #1. However an SAR value of 11.5 is combined with an extreme pH of 9.0 in the top 1.5 feet.
- Total Organic Carbon at site #1 was reported to be 22% in the top 2 feet and dropped to below 5% at fifteen feet depth. In addition, at site #6, the Total Organic Carbon content was 36% in the top two feet and remained above 21% for the entire depth of sampling, exceeding 50% at the nine to ten foot depth increments.
- At all depths, at both sites, selenium content exceeded the recommended limits in the Division guidelines.

Sampling to determine the extent of the toxic material and to discover substitute topsoil at depth in the fill will be continued in 2002 (submittal, page 2-4). Sample points will be placed randomly in the refuse areas, and samples will be taken at three-foot depth intervals to a point four feet below the grade of the proposed final surface configuration. Samples will also be taken

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along the proposed channel location. The 2002 sampling may include trenching at various locations.<sup>1</sup> This commitment is acceptable.

All soil and refuse sampling will be conducted by a qualified individual (page 2-4). Said persons credentials will be submitted to the Division. The Division soil scientist would appreciate being present when the samples are taken.

**Findings:**

Information provided in the proposal is adequate to meet the requirements of Operation Plan, Topsoil and Subsoil section of the Regulations.

## **RECLAMATION PLAN**

### **TOPSOIL AND SUBSOIL**

Regulatory Reference: 30 CFR Sec. 817.22; R645-301-240.

**Analysis:**

**Redistribution**

Table 3-1 shows the timing of various steps in reclamation, and Table 3-2 is a schedule of monitoring activities. Except for soil sampling, the reclamation timetable does not show months in which the activities would occur, but a note below the table discusses the timing of seeding and planting more specifically. Soil salvage and replacement activities would be done during backfilling and grading operations.

Reclamation will involve three disturbed areas: Deer Creek Canyon, Deer Canyon, and Elk Canyon. According to the backfilling and grading plan in Section R645-301-553 of the application, reclamation will begin at the uppermost parts of the disturbed areas and will proceed down the canyons. Various stages of the process will be occurring simultaneously. Substitute topsoil will be excavated from the existing undisturbed drainage corridor and stored in the area of the dismantled truck load out and storage area (Area #2, see DS-1796-D in Appendix R645-301-500A).

Maps DS1783D Sheets 1 and 2 illustrate that the substitute topsoil will be excavated along the length of the Deer Creek drainage between stations 1+00 and 32+00. The locations of

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<sup>1</sup> Personal communication on January 2, 2002 with Dennis Oakley, Environmental Engineer with Energy West Mining Company.

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these cross sections are shown on map DS-1782-D. It is estimated 58,891.08 cubic yards of material is available which gives an average cover depth of 27 inches over 16 acres as illustrated on Map DS-1816-D. The plan does not indicate the average depth of cover over the site after factoring into the calculations the four feet of cover required over the refuse in Elk Canyon and Deer Creek Canyon.

The plan overlooks as a source of suitable substitute topsoil, the upper 18 – 24 inch layer on the fill slopes at the equipment yard and run of mine conveyor which were seeded twenty years ago and have been identified in the approved MRP as substitute topsoil due to their improved rooting environment suitable for seed germination and microorganism colonization (approved MRP, Vol. 2, Part 4 Reclamation Plan page 4-29).

### *Soil Nutrients and Amendments*

The biology chapter of the application says fertilizer will be applied at the rate of 40 pounds per acre of ammonium nitrate and 35 pounds per acre of triple superphosphate. The Division encourages operators to use minimal amounts of fertilizer, and these quantities are relatively low.

In addition to the fertilizer, the applicant commits to apply one ton per acre of certified noxious weed free hay, and the hay and fertilizer will be incorporated into the soil in the gouging process. This should help to increase the amount of organic matter and the fertility and structure of the substitute topsoil.

### **Refuse Pile Reclamation**

To date, information on the refuse shows that it is unsuitable as a plant growth medium. However, sampling of vegetation established on portions of the refuse pile for interim erosion control indicates the refuse can, at least in some areas, support vegetation. In 1998, vegetation cover on the refuse pile was measured by the applicant's consultant as 40.5%, and in 1999, vegetation cover on the pinyon-juniper reference area was roughly estimated as about 40%. While this seems to indicate the refuse can, by itself, support adequate vegetation, there is no vegetation established on the area of the refuse pile where the high salt concentrations were found near the surface.

Refuse distributed in the fill must be covered by four feet of non-toxic material. Refuse that is cut during grading will be used as fill along cut banks and highwalls. Any acid-forming or toxic materials will be covered with four feet of non-acid and/or nontoxic material (page 2-3 of the submittal). The method of achieving four feet of cover will either be through excavating a pit and burial of the acid/toxic refuse or by sacrificing non-toxic substitute topsoil covering from other areas of the mine site. This information was received in response to the Division's last

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Rills and gullies which develop to a depth of nine inches or greater in areas that have been re-graded and topsoiled and which either; (1) disrupt the approved post-mining land use or the reestablishment of the vegetative cover, or (2) cause or contribute to the violation of water quality standards for receiving streams will be filled, regraded, or otherwise stabilized. The topsoil will be replaced and the areas will be reseeded.

**Findings:**

Information provided in the application is adequate to meet the requirements of this section of the regulations.

**RECOMMENDATIONS:**

The inspector for this site must be briefed on the multiple commitments made for refuse, fills and substitute topsoil sampling information to be collected in 2002.

The refuse is not acceptable as a plant growth medium and must be covered with four feet of material. There is no surplus of cover material. A source of suitable plant growth material is the vegetated out slopes of the mine yard as presently identified in the approved MRP. This source of substitute topsoil has been omitted from the submittal and should be included.

For the purposes of planning burial and cover requirements, the Division requests information on the volume of toxic mine waste to be backfilled and reclaimed (represented by sample sites #1 and #6).

The reclamation plan does not include the four terraces created pre-law. This area has been brought to the attention of the Abandoned Mine Reclamation personnel.